MA Updated Code Review

Updated Code Review

AGENDA

- Quick History of “Recent” Energy Efficiency in MA
- Updated Energy Code – RESIDENTIAL
  - Stretch
  - Opt-in Specialized
- Updated Energy Code – COMMERCIAL
  - Stretch
  - Opt-in Specialized

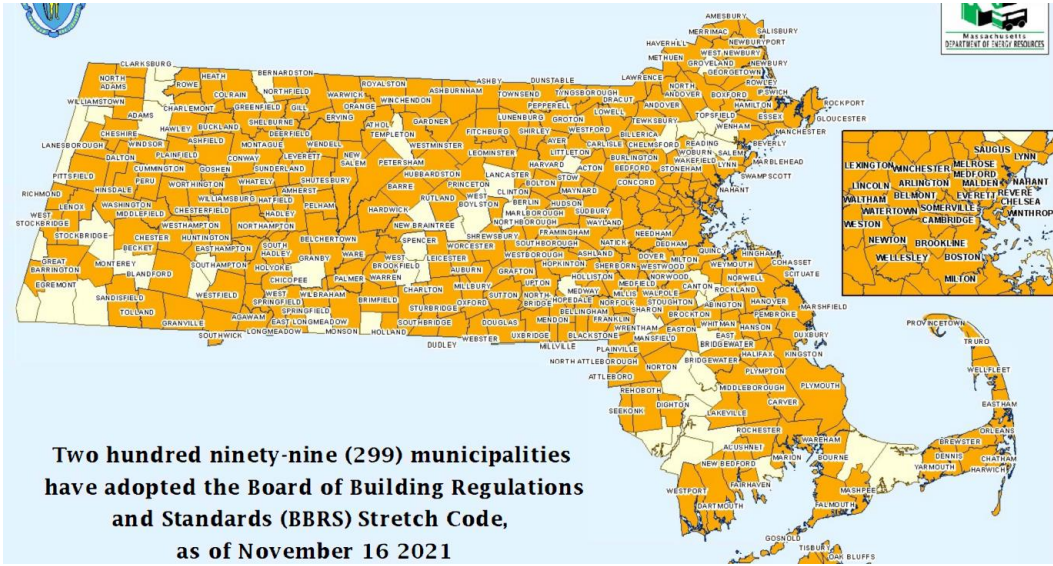
Updated Code Review

1997: Restructuring the electric utility industry

- Separate generation from supply
- Create energy efficiency and renewable energy funds
- Create Renewable Portfolio Standard (RPS)

2008: Green Communities Act

- Utility companies must incentivize energy efficiency improvements
- State must adopt the latest edition of the energy code
- Establishes a Green Communities division at DOER
- Establishes net metering
- Accelerates RPS Requirements
- Massachusetts participates in the Regional Greenhouse Gas Initiative (RGGI)
- Creates Stretch Code



Updated Code Review

HERS 100

KEY DATES:

Date	Description	Changes
January 1, 2008	7th edition of the Building Code	Base Code: IECC 2006 and ASHRAE 90.1-2007 with Mass Amendments
January 1, 2010	8th Edition of the Building Code	Base Code: IECC 2009 and ASHRAE 90.1-2007 Stretch Code (Appendix AA) • HERS 65 for units > 3,000 sf • HERS 70 for units < 3,000 sf • 20% reduction from ASHRAE 90.1-2007 for commercial buildings
July 1, 2013	Energy Code Update	Base Code updated to 2012 IECC and ASHRAE 90.1-2010 Stretch Code unchanged
January 1, 2017	Energy Code Update	Base Code updated to 2015 IECC and ASHRAE 90.1-2013 • HERS 55 for all units (allowance for renewables) Stretch Code: • Added Passive House and ES as compliance pathways • 10% reduction for commercial
Nov 7, 2020	9th Edition of the Building Code	• Base Code and Stretch Code (additional amendments) updated to 2018 IECC ASHRAE 90.1-2016

Updated Code Review

CLIMATE ACT OF 2021

- Chapter 8: An act creating a next-generation roadmap for Massachusetts climate policy
  - A net zero statewide greenhouse gas emissions goal by 2050; requirement 85% reduction from 1990 level.
  - Set goals for municipal lighting plants (excluded from GCA)
  - Shifted responsibility for Stretch code from BBRS to DOER and added the Opt-in Specialized Stretch code

Updated Code Review

Energy Codes in Massachusetts:

DOER

Base Code (IECC 2021)

- New construction in towns & cities not a green community
- **52 communities**

Expected from BBRS: **July 2023**

Stretch Code (2023 update)

- New construction in towns & cities that are a green or stretch community
- **299 communities**

Residential : Jan 2023
Commercial: July 2023

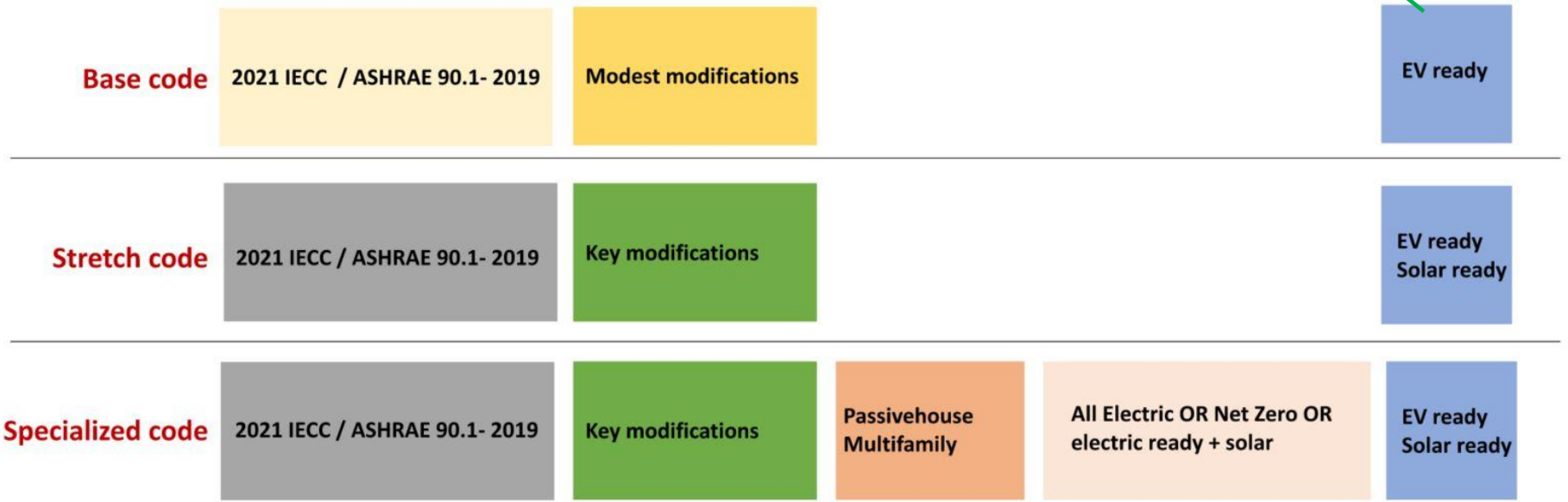
Specialized Code ("Net-Zero")

- New Construction in towns & cities that vote to opt-in to this code
- **Effective date:** Typically 6-11 months after Town/City vote

Updated Code Review

Three pathways will be available:

A designated parking space which is provided with wiring and electrical service sufficient to provide AC level II or equivalent EV charging (SAE J1772)



Updated Code Review

Stretch Code Timeline:

Updated Code Review – RESIDENTIAL STRETCH

225 CMR 22.00 – Definition: Includes detached 1 and 2 family dwellings and THs as well as Group R-2, R-3, and R-4 buildings three stories or less in height above grade

Stretch Code Pathways

- Prescriptive Path (Option 1)
  - Comply with R401 – R404 and two Additional Efficiency Package (R408)
    - Enhanced Envelope performance option
    - More efficient HVAC equipment
    - Reduced energy use in service water heating

No fossil fuel allowed

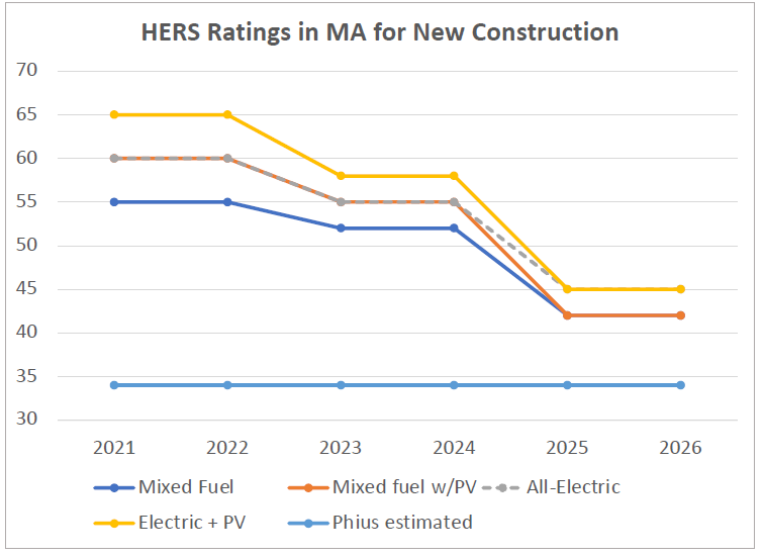
- R401 – General
- R402 – Building Thermal Envelope
  - Insulation (R402.2)
  - Fenestration (R402.3)
  - Air Leakage (R402.4)
- R403 – Systems
  - Controls, ducts, piping insulation, services hot water systems, mechanical ventilation, equipment sizing and efficiency rating, central systems, and other
- R404 – Electrical Power and Lighting Systems
  - Lighting equipment
  - Interior and exterior controls

Updated Code Review – RESIDENTIAL STRETCH

Stretch Code Pathways

- Energy Rating Index (ERI) (Option 2)
  - Follows Energy Rating Index Compliance Alternative (R406)
  - Adds Mechanical balanced ventilation with energy recovery (R403.6)
  - Wiring for EV Charging space (R404.4)

New Construction			
	Max. HERS index (before solar credit)		
On-site Clean Energy application	2017-2022	Jan 1, 2023	July 1, 2024
Mixed-fuel	HERS 55	HERS 52	HERS 42
Mixed-fuel & Solar	HERS 60	HERS 55	HERS 42
All-Electric	HERS 60	HERS 55	HERS 45
All-Electric & Solar	HERS 65	HERS 58	HERS 45



Based on Table R406.5

Updated Code Review – RESIDENTIAL STRETCH

Stretch Code Pathways

- Passive House Building Certification (Option 3)
  - PHI or Phius
  - Follow most recent standard
  - Wiring for EV Charging space
- Appendix RC – optional compliance with Specialized Code
- NO Energy Star option

Updated Code Review – RESIDENTIAL STRETCH

Chapter 5 Existing Buildings

- Additions (R502)
  - *Additions* shall conform to new construction without requiring the unaltered portion of the existing *building* to comply
  - An *addition* shall be deemed to comply where
    - the *addition* alone complies,
    - the existing *building* and *addition* comply with this code as a single building, or
    - the *building* with the *addition* meets HERS rating per Table R406.5
  - >1000sf – must meet HERS score in Table R406.5 (R502.1.1)
  - >100% of conditioned floor area must meet HERS in Table R406.5
- Alterations (R503)
  - Level 3 Alterations (over 50% of home is renovated/reconfigured), or over 100%, or over 1000 sf shall require the *dwelling unit to comply* with alterations additions or change of use as shown in Table R406.5 (R503.1.5)

Additions, Level III Alterations and Change of Use - Over 1,000 sf		
	Max. HERS index (before solar credit)	
On-site Clean Energy application	2017-2022	Jan 1, 2023
Mixed-fuel	HERS 65	HERS 52
Mixed-fuel & Solar	HERS 70	HERS 55
All-Electric	HERS 70	HERS 55
All-Electric & Solar	HERS 75	HERS 58

Updated Code Review – RESIDENTIAL SPECIALIZED

Adoption required (Opt-in)

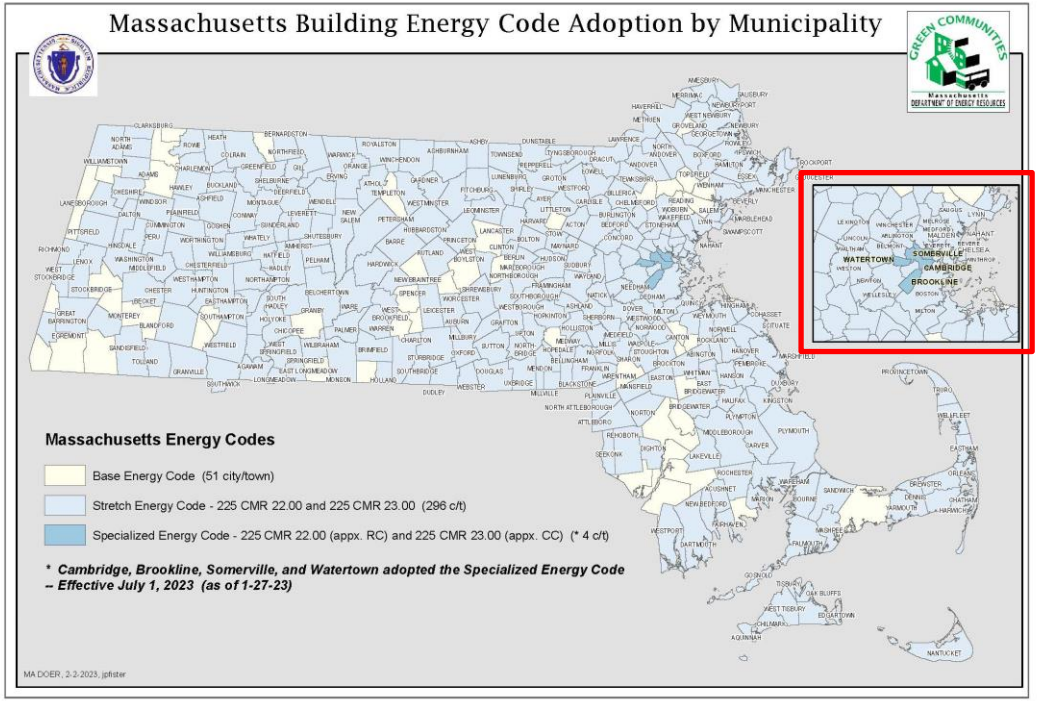
- Warrant article
- Town Meeting Bylaw vote or City Council vote

Timeline

- Vote to adopt
- Effective date six months after on Jan 1 or July 1

Likely first adopters:

- Boston, Cambridge, Somerville
- Brookline, Newton, Watertown



NEW ECOLOGY
Community-Based Sustainable Development

Updated Code Review – RESIDENTIAL SPECIALIZED

APPENDIX RC – MASSACHUSETTS MUNICIPAL OPT-IN SPECIALIZED STRETCH CODE 2023

- *RESIDENTIAL LOW-RISE BUILDING PROVISIONS*

Three compliance pathways

- Zero Energy pathway (Option 1)
  - HERS 0 (RC102.2)
    - HERS 45 – all electric
    - HERS 42 – mixed fuel (net kWh exporter)
    - On site renewables
  - Phius ZERO and Section R405
    - RECs or off-site renewables not allowed

NET ZERO BUILDING DEFINITION:

A building which is consistent with achievement of MA 2050 net zero emissions, through a combination of highly energy efficient design together with being an all-electric or Zero Energy Building, or where fossil fuels are utilized, a building fully pre-wired for future electrification and that generates solar power on-site from the available Potential Solar Zone Area.

Updated Code Review – RESIDENTIAL SPECIALIZED

- All-Electric pathway (Option 2)
  - No fossil fuels on site and HERS 45 or Passive House (RC103.1)
  - Solar Ready but no PV required (Appendix RB)
  - Wiring for EV (R404.4)
- Mixed-Fuel pathway (Option 3)
  - Passive House or HERS 42 AND:
  - Wired for electric (RC104.3)
  - PV required (RC104.4)

Exceptions to PV:
- Roof area not oriented between 110 degrees and 270 degrees of true north
- Areas of the roof that would otherwise meet the requirements of Section RC105 are in full or partial shade for more than 70 percent of daylight hours annually.

Appendix RB: Definition of solar-ready zone area (RC105)
- Single family: not less than 300 square feet exclusive of mandatory access or set back areas as required by the MA Fire Code.
- New townhouses: total floor area less than or equal to 2,000 square feet per dwelling shall have a solar-ready zone area of not less than 150 square feet
- The solar-ready zone shall be composed of areas not less than 5’ Wide and no less than 80 square feet exclusive of access or set back areas as required by the MA Fire Code.

Updated Code Review – RESIDENTIAL SPECIALIZED

- Mixed-Fuel pathway continued (RC104)
  - Building and each dwelling unit pre-wired for electrification (RC104.3)
  - 20% of parking pre-wired for EV charging
  - 'Clean biomass heating systems' allowed

New dwelling units over 4,000 sf must comply with either all-electric pathway or Zero-energy pathway

R-use buildings with total conditioned floor area **over 12,000** sf shall comply with the provisions of Section **R405 Passive House** Building Certification Option

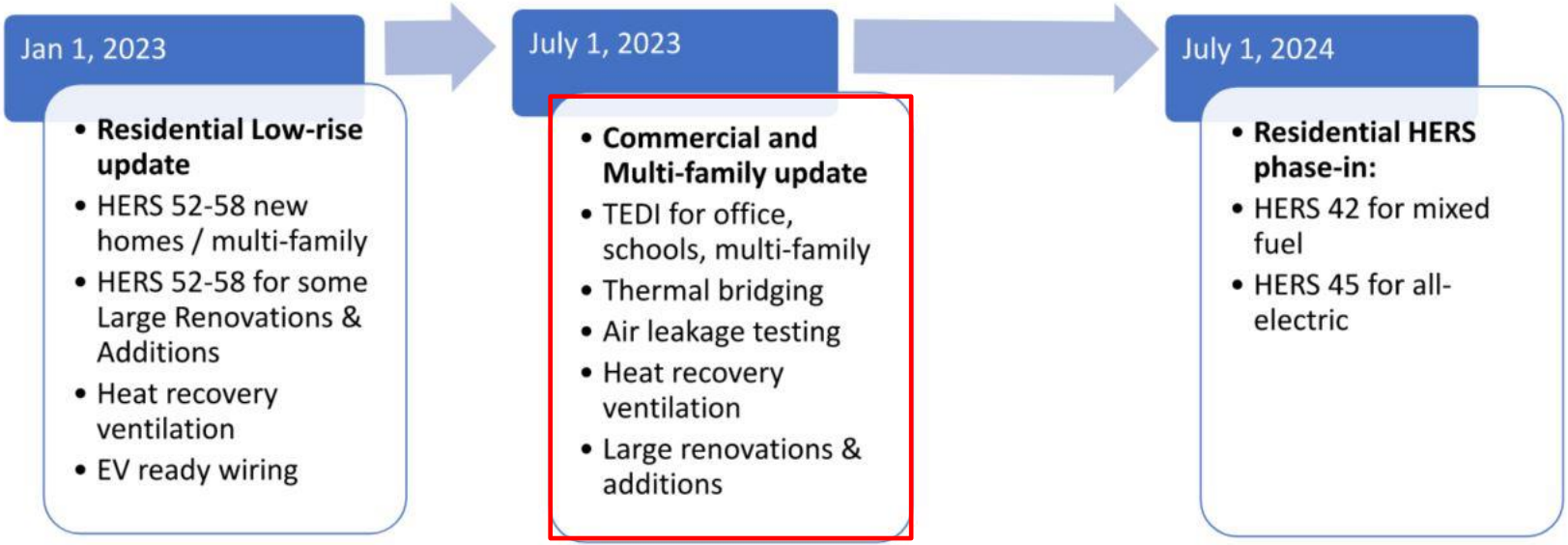
Electric Readiness (RC104.3) – "Pre-Wired"

- RC104.3.1 Space Heating – provide:
  - Natural drainage for condensate
  - Dedicated branch circuit per IRC Section E3702.11 based on sizing calculations per R403.7 (ACCA Manual S and J) terminating within 3 feet of the location. Both ends of the branch circuit shall be labeled "For Future Heat Pump Space Heater."
- RC104.3.2 Household Ranges and Cooking Appliances.
  - Individual branch circuit outlet with a minimum rating of 250-volts, 40-amperes within 3 feet of each gas or propane range or permanently installed cooking appliance.
- RC104.3.3 Household Clothes Dryers and Water Heaters.
  - An individual branch circuit outlet with a minimum rating of 250-volts, 30-amperes within 3 feet of each gas or propane household clothes dryer and water heater.
- RC104.3.4 Water Heating Space. Any permanently installed domestic hot water heating equipment shall be installed in an indoor space:
  - with a minimum volume of 700 cubic feet or the equivalent of one 16x24 inch grill to a heated space and one 8-inch duct of no more than 10 feet for cool exhaust air.
  - that is at least 3'x3'x7' high surrounding or within 3 feet (914 mm) of the installed water heater.

Updated Code Review – KEY TAKEAWAYS

Stretch Code	Specialized Code
Reduced HERS scores	Not likely in effect until Jan 1, 2024
ERV Required	Mixed fuel buildings must be pre-wired
Wiring for EV charging required	3 compliance pathways - Zero energy - All electric - Mixed Fuel – PV Required
No Energy Star option	>12,000 sf requires PH certification
PH Documentation updated	
Additions/Renovations no longer exempt	

Updated Code Review – COMMERCIAL STRETCH



Updated Code Review – TEDI

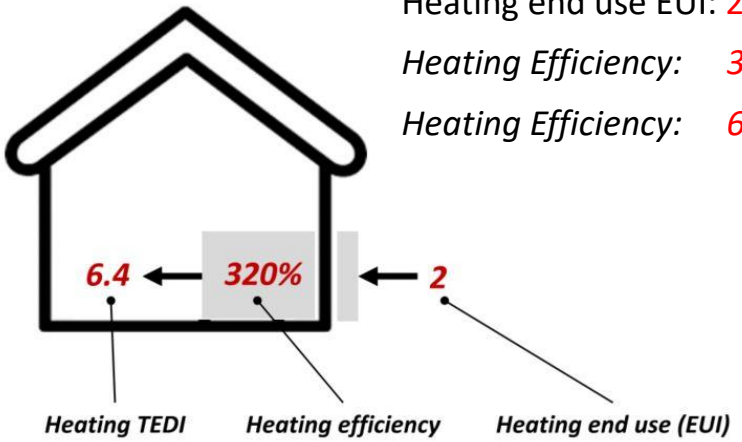
FIRST LET'S TALK ABOUT TEDI

- *Thermal Energy Demand Intensity*

Heating TEDI	Total annual energy delivered to the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)
Cooling TEDI	Total annual energy removed from the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)

Updated Code Review – TEDI

HOW TO DIFFERENTIATE BETWEEN TEDI AND EUI



Heating end use EUI: 2 kBtu/sf-yr

Heating Efficiency: *320%*

Heating Efficiency: *6.4* kBtu/sf-yr

TEDI is not the same as EUI. TEDI is a measure of envelope performance, air infiltration, and ventilation energy recovery.

EUI is a measure of the above, plus equipment efficiency.

TEDI is demand while EUI is consumption

Regulating TEDI means prioritizing envelope, air infiltration, and energy recovery

Updated Code Review – TEDI

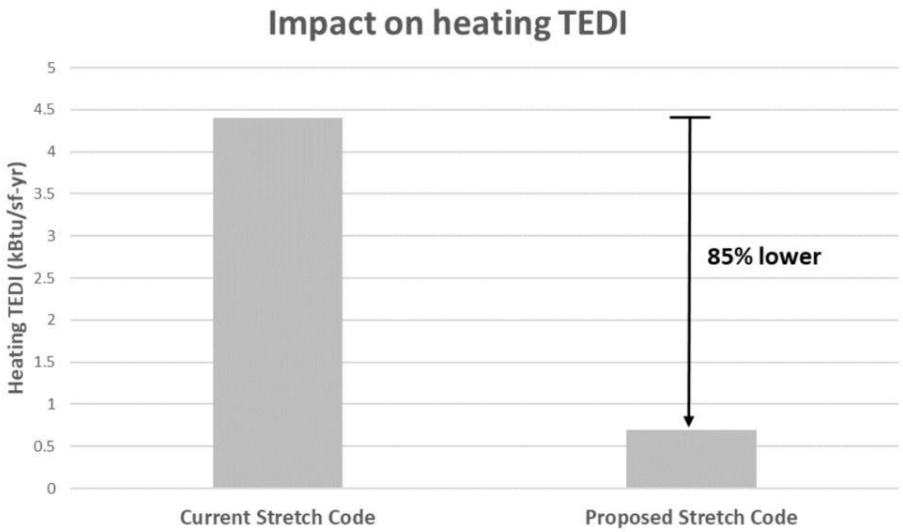
CURRENT TEDI LIMITS FOR MF AND OFFICE BUIDLINGS

Use Type	Heating TEDI	Cooling TEDI
Residential multifamily and dormitory ≥ 125,000-s	2.8	22
Residential multifamily and dormitory between 75,000 and 125,000-sf	3.8 – 0.000008 * Area (sf)	4.5 + 0.00014 * Area (sf)
Residential multifamily and dormitory ≤75,000-sf	3.2	15
Office, fire station, library, police station, post office, town hall ≤ 125,000-sf	1.5	23
Office, fire station, library, police station, post office, town hall between 75,000 and 125,000-sf	4 – 0.00002 * Area (sf)	18 + 0.00004 * Area (sf)
Office, fire station, library, police station, post office, town hall ≤75,000-sf	2.5	21

Updated Code Review – TEDI

WHY TEDI?

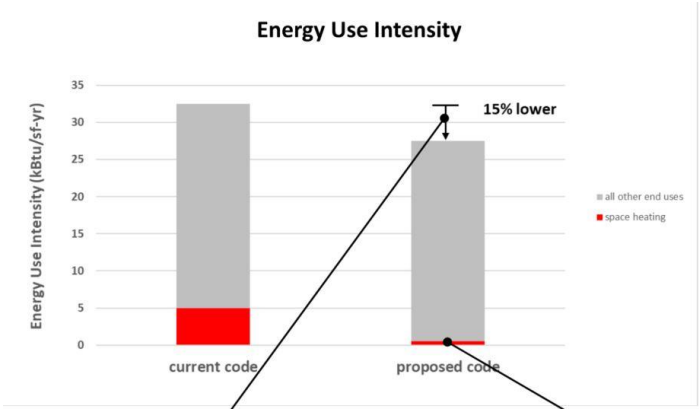
HIGHER PERFORMING BUILDING



Updated Code Review – TEDI

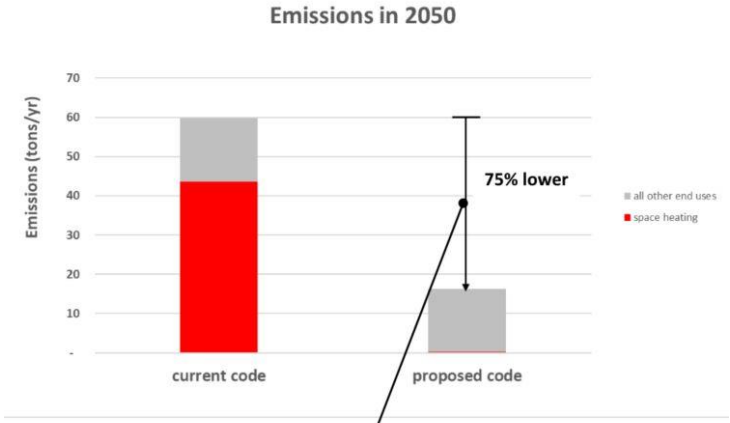
WHY TEDI?

REDUCTION IN EMISSIONS



Overall reduction in energy use seems modest (15%)

However, heating end use is significantly reduced (90%)



The payoff is huge reduction in building emissions (75%)

Updated Code Review – COMMERCIAL STRETCH

IMPLEMENTATION TIMELINE:

All non-residential commercial buildings: July 1, 2023

Multifamily commercial buildings follow schedule below:

10% better than ASHRAE 90.1-2019

	Updated Stretch Code July 1, 2023 through June 30, 2024	Updated Stretch Code Beginning July 1, 2024
Targeted Performance	Optional	Optional
HERS	Optional HERS 52/55	Optional HERS 42/45
Passive House	Optional	Optional
Relative Performance	Optional	Not allowed

MF Residential ONLY

Updated Code Review – COMMERCIAL STRETCH

ENERGY CODE OPTIONS:

	Current	Updated
Base Code	IECC 2018 with MA amendments	IECC 2021 with MA amendments
Stretch Code	IECC 2018 with MA amendments and Stretch Code amendments (Appendix AA)	IECC 2021 with MA amendments + Stretch Code amendments
Specialized Code	Not Available	IECC 2021 with MA amendments + Stretch Code amendments + Specialized Code appendices

Updated Code Review – COMMERCIAL STRETCH

STRETCH CODE PATHWAYS

Only options available for R group buildings after July 1, 2024. Other building types may follow either path

Prescriptive and Performance Compliance (C401.2.1)

1. Prescriptive Compliance (Option 1): to be used for non-residential buildings ≤20,000sf
2. Targeted Performance Compliance (Option 2) Thermal Energy Demand Intensity (TEDI)
3. Relative Performance Compliance (Option 3) (ASHRAE 90.1-2019 Appendix G)

Certified Performance Standard Compliance (C401.2.2)

1. Passive House Compliance (Option 4a)
2. HERS Compliance (Option 4b)

Option not available for R group buildings or portions of buildings after July 1, 2024

Exception: Additions, alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5. This exception does **not** include **tenant space fit out** zones when constructed for the first time.

Updated Code Review – COMMERCIAL STRETCH

TARGETED PERFORMANCE IN MORE DETAIL (Option 2)

Targeted Performance Compliance: Thermal Energy Demand Intensity (TEDI)

A. Dormitory, fire/police station, library, office, school, post office and town hall building types when ventilation at full occupancy ≤0.5 cfm/sf and >20,000 sf, must use this pathway (July 1, 2023).
    a) This pathway is also available to all other buildings
B. RESIDENTIAL:
    a) After July 1, 2024, residential buildings > 12,000sf shall use this pathway
    b) Buildings may comply with C401.2.2 Certified Performance Standard Compliance
        1. Passive House Compliance: This pathway can be used for any building of any size.
        2. HERS Compliance: This pathway can be used for any Group R building with multiple individual dwelling units

When Specialized Code adapted, only PH pathway allowed for residential buildings.

Updated Code Review – COMMERCIAL STRETCH

RELATIVE PERFORMANCE IN MORE DETAIL - ASHRAE 90.1-2019 Appendix G (Option 3)

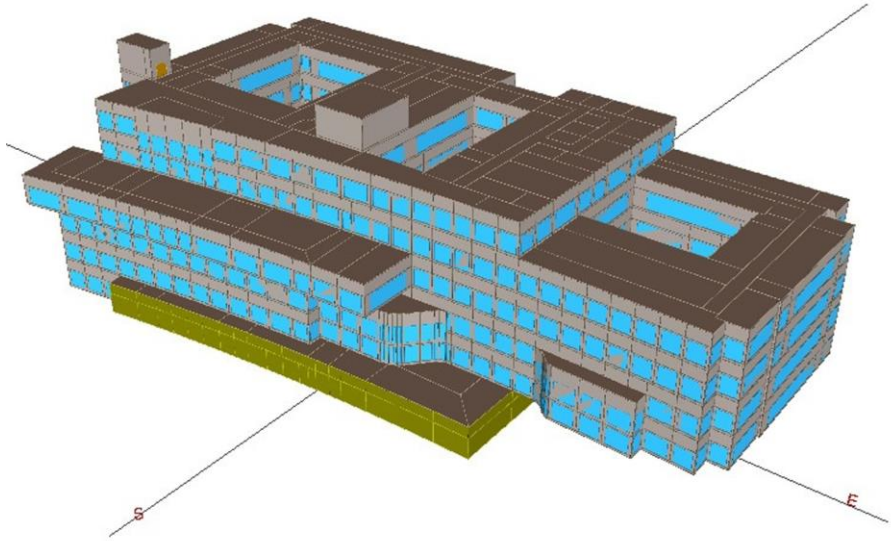
Applies to High ventilation buildings and all buildings not required to use Option 2 can opt to use Option 3, except:

- Multi-family cannot use ASHRAE path after July 1, 2024

Requires 10% improvement

Requires compliance with multiple sections C401 – C407

Highly Ventilated Buildings are defined as having average ventilation at full occupancy > 0.5 cfm/sf



NEW ECOLOGY
Community-Based Sustainable Development

Updated Code Review – COMMERCIAL STRETCH

KEY MODIFICATIONS

- Thermal Envelope Certificate is required and must be posted in the building
- Curtainwall Backstop
  - Glazed Wall System: ≤ 50% WWR – Area weighted U ≤ 0.1285; glazed wall system whole assembly U factor ≤ 0.25
  - High Glazed Wall System Buildings: >50% WWR - Area weighted U ≤ 0.1600; whole assembly U factor ≤ 0.25

GLAZED WALL SYSTEM. System consisting of any combination of both vision glass and/or *spandrel sections* to create an above-grade wall that is designed to separate the exterior and interior environments. These systems include, but are not limited to, curtain walls, window walls, and storefront windows.
AREA-WEIGHTED U PROPOSED = U value for each distinct assembly type of the above grade wall portion of the building thermal envelope weighted by vertical area for each distinct assembly type

Updated Code Review – COMMERCIAL STRETCH

KEY MODIFICATIONS

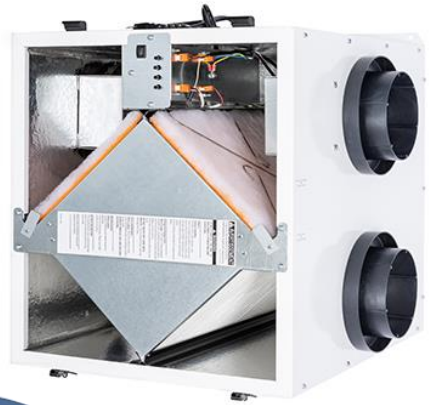
- Documentation in design and construction is required
- Whole Building Infiltration testing is mandatory
  - 0.35 cfm75/ft2
  - 0.35 ≤ results ≤ 0.45 shall require passive remediation
  - Results > 0.45 require destructive remediation
- Dwelling and sleeping unit enclosure test (guarded test not allowed)
  - < 8 units = no sampling
  - ≥ 8 units, 7 units or 20% (the greater) sampling required
  - Sample must include, ground, middle, and top floor unit and a unit with the largest testing unit enclosure

NEW ECOLOGY
Community-Based Sustainable Development

Updated Code Review – COMMERCIAL STRETCH

KEY MODIFICATIONS

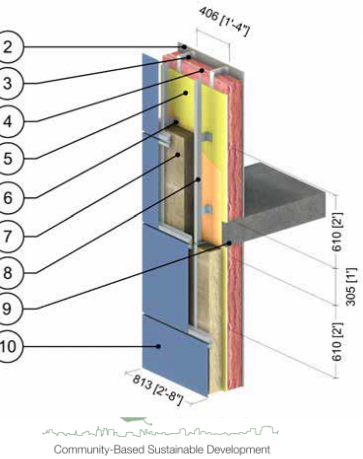
- Energy Recovery Ventilation is mandatory
- For non-transient dwelling units not less than 75% at heating design condition. Outdoor air must be delivered directly to the dwelling unit. The building weighted average sensible energy recovery effectiveness must meet the requirements
  - A sensible recovery ratio of at least 50% at heating design conditions for systems that provide makeup for Class 3 or 4 exhaust.
  - An enthalpy recovery ratio of not less than 70% at heating and cooling design conditions for all other systems.

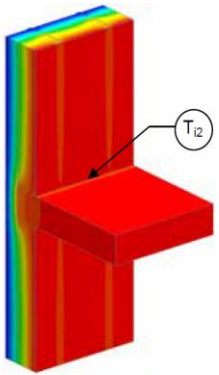


Updated Code Review – COMMERCIAL STRETCH

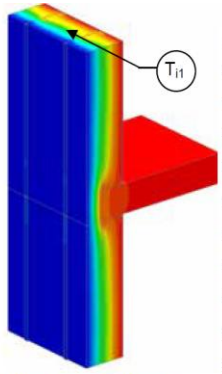
KEY MODIFICATIONS

- Thermal Bridge Accounting is mandatory
- Derating of insulation value can be accomplished using 3 options:
  - Prescriptive
  - Reference
  - Modeling





View from Interior



View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-24.9 (4.38 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index[1]	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

[1]Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

THERMAL BRIDGE: Part of the *building envelope* where otherwise uniform thermal resistance is changed by full or partial penetration of the thermal insulation by materials with higher thermal conductivities and/or where the interior and exterior areas of the envelope are different, such as, but not limited to, parapets and corners.

- CLEAR FIELD: A *thermal bridge* that is uniformly distributed throughout an assembly such that accounting for the *thermal bridge* individually is impractical for whole-building calculations.
- LINEAR: A *thermal bridge* that is continuous in one direction of the exterior envelope.
- POINT A *thermal bridge* that is discrete and countable on an individual basis for whole-building calculations.

Updated Code Review – COMMERCIAL STRETCH

KEY MODIFICATIONS

EV Ready requirements are mandatory

- New parking spaces shall provide EV Ready Spaces
  a. Group R and B – 20% of spaces
  b. All Other Occupancies – 10% of spaces
- Installed wiring suitable for AC Level II EVSE shall be connected to the service panel and run to within 6 feet (1828mm) of any qualifying parking space

ELECTRIC VEHICLE READY PARKING SPACE: A designated parking space which is provided with wiring and electrical service sufficient to provide AC Level II or equivalent EV charging, as defined by Standard SAE J1772 for *EVSE* servicing light duty *electric vehicles*.

Updated Code Review – COMMERCIAL STRETCH

KEY MODIFICATIONS

Electrification is encouraged in many cases and required in others:

- For Highly ventilated buildings, partial space heating electrification is required. Heat pump systems shall supply 25% of the building's peak space heating and ventilation air heating load.

NEW ECOLOGY
Community-Based Sustainable Development

Updated Code Review – COMMERCIAL SPECIALIZED

Adoption required (Opt-in)

- Warrant article
- Town Meeting Bylaw vote or City Council vote

Timeline

- Vote to adopt
- Effective date six months after on Jan 1 or July 1

Likely first adopters:

- Boston, Cambridge
- Brookline, Newton

This code builds on the Stretch Code and does not eliminate any of the requirements of 225 CMR 23

Updated Code Review – COMMERCIAL SPECIALIZED

SPECIFICALLY TO MULTIFAMILY NEW CONSTRUCTION

Table CC101.2 Multi-family and R-use Compliance			
R-Use buildings over 12,000 sf, or R-Use portions over 12,000 sf in mixed-use buildings	Compliance Path options by permit submittal date		
	C407.3 Passive House	C407.1 Targeted Performance	C407.4 HERS Index
Up to 5 stories	Required from Jan 1, 2023		
6 stories and higher	Required from Jan 1, 2024	Optional until Jan 1, 2024	Optional until Jan 1, 2024

Updated Code Review – COMMERCIAL SPECIALIZED

APPENDIX CC – MASSACHUSETTS MUNICIPAL OPT-IN SPECIALIZED STRETCH CODE 2023

(New) Definitions (CC102)

1. Net Zero Emission Building. A building which is consistent with achievement of MA 2050 net zero emissions, through a combination of highly energy efficient design together with being either a Zero Energy Building, or an All-Electric Building, or where fossil fuels are utilized, the building is fully pre-wired for future electrification and generates solar power on-site from the available Potential Solar Zone Area.

2. Potential Solar Zone Area. The combined area of any low-sloped roofs and any steep-sloped roofs oriented between 90 degrees and 300 degrees of true north where the annual solar access is 70 percent or greater. Annual solar access is the ratio of “annual solar insolation with shade” to the “annual solar insolation without shade”. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

3. Zero Energy Building. A building which through a combination of highly energy efficiency design and onsite renewable energy generation is designed to result in net zero energy consumption over the course of a year as measured in MMBtu or kWh_{eq}, on a site energy basis, excluding energy use for charging vehicles.

Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

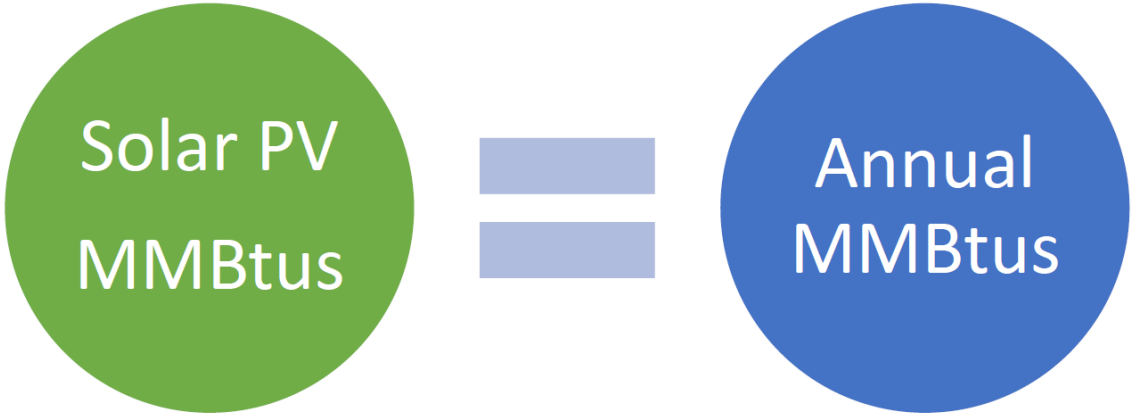
Zero Energy pathway (Option 1): *Mixed Fuel Buildings* with any capacity for on-site fossil fuel use shall be pre-wired for future electrification.

1. RECs are not allowed
2. To determine size of renewable system using the Prescriptive Pathway EUI selected from Table CC103.1 will be used
3. For modeled buildings, energy simulation results shall be used.

Prescriptive path only

Table CC103.1 EUI for Building Types

Building Area Type	Climate Zone 5A kBtu/ft2*yr	Climate Zone 5B kBtu/ft2*yr
Healthcare (I-2)	118	110
Hotel (R-1)	71	68
Multifamily (R-2)	47	46
Office (B)	28	25
Rewstaurant (A-2)	531	484
Retail (M)	52	50
School (E)	39	43
Warehouse (S)	23	17
All Others	57	54

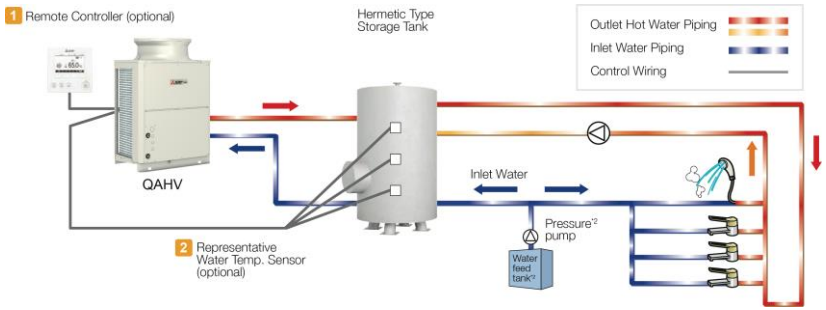


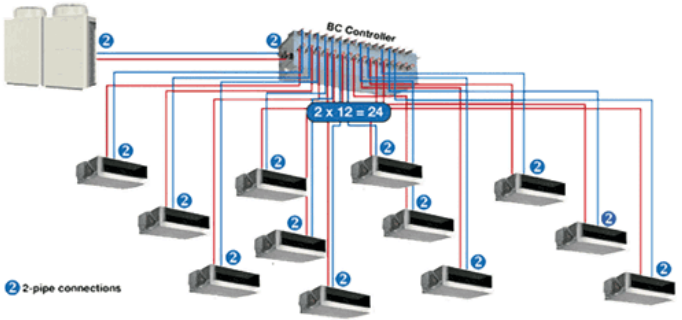
Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

All-Electric pathway (Option 2):

1. Heating, ventilation, and hot water shell be delivered using heat pumps or renewable energy.
2. Exclusively R-use buildings permitted prior to January 2024 may use HERS Index for MF Buildings when all dwelling units have a HERS rating of 45 or less.





Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

Mixed Fuel Pathway (Option 3): Additional requirements where on site fossil fuels are planned.

- Biomass heating is allowed
- On-site renewable energy is required: 1.5 W/ft² (16.1 W/m²) multiplied by the sum of the gross conditioned floor area of the three largest floors
- Additional efficiency requirements
  - More efficient HVAC equipment for heating and cooling equipment
  - Reduced energy use in service water-heating option

CLEAN BIOMASS HEATING SYSTEM.

- Wood-pellet fired central boilers and furnaces with less than 3 million Btu/hour rated heat input, where the equipment has a thermal efficiency rating of 85% (higher heating value) or greater; and a particulate matter emissions rating of no more than 0.08 lb. PM2.5/MMBtu heat output.
- Wood chip fired central boilers and furnaces with less than 3 million Btu/hour rated heat input, where the equipment has a thermal efficiency rating of 80% or greater and a particulate matter emissions rating of no more than 0.10 lb. PM2.5/MMBtu heat output.

Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

Mixed Fuel Pathway (Option 3): Additional requirements where on site fossil fuels are planned.

Entire building and every unit must be prewired:

- Gas-fired or oil-fired water heaters ≤ 300,000 Btu/h or 88 kW
- Cooking Ranges, ovens and cooktops (CC106.1.3)
  - Exception: Commercial kitchens for cafeteria, restaurant or commercial catering business use
- Clothes Dryers (CC106.1.4)
  - Exception: commercial drying equipment used for manufacturing and process loads
- Other Combustion equipment

Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

Mixed Fuel Pathway (Option 3): Additional requirements where on site fossil fuels are planned.

- All electric design is required at building permit
- Design documents must include
  - Future electric equipment schedule,
  - List of combustion equipment to be replaced,
  - Electrical, structural, and architectural infrastructure upgrades (these must be installed during construction)
  - Space allotments for future equipment
- HVAC Compatibility
  - Design must show that systems serviced by combustion equipment can also be services by future electric equipment
- Equipment Efficiencies
  - Dictated by C401.4.3.

Updated Code Review – COMMERCIAL SPECIALIZED

SPECIALIZED CODE PATHWAYS

Mixed Fuel Pathway (Option 3): Additional requirements where on site fossil fuels are planned.

Additional electric infrastructure must be installed

- Infrastructure shall be installed as part of building construction to accommodate future electric retrofit
- Includes
  - power infrastructure to building
  - electric service to future distributed equipment
  - conduits to accommodate controls
  - structural and architectural elements to accommodate future retrofit equipment.
- Space for Future Retrofit Equipment
  - Interior and exterior space shall be allotted to accommodate all future electric retrofit equipment.
  - Signage, labels, and borders shall be used to prominently display areas and limits set aside for future equipment to prevent encroachment.

NEW ECOLOGY
Community-Based Sustainable Development